

SPECIFICATION

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TITLE: APPARATUS HAVING IMPROVED WIND RESISTANCE
10 THAT IS A SYNERGISTIC COMBINATION OF A WINDSHIELD
AND A BROODER HEATER PILOT ASSEMBLY

CROSS REFERENCE TO RELATED APPLICATION

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This application claims the benefit of U.S. Provisional Application No. 60/441,071
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FIELD OF THE INVENTION

The present invention relates to a poultry brooder gas heater having a radiant or
ceramic element, and more specifically, to an apparatus which is a synergistic combination
25 of a windshield and an improved pilot light assembly having superior wind resistance.

BACKGROUND OF THE INVENTION

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Maintaining proper brooding temperature is critical to effective poultry brooding
since temperature variations cause chicks to expend energy to maintain body temperature
rather than to increase body weight. Thus, it is desirable to keep the poultry house warm so
that the food energy contained in the feed is used to produce weight gain by the bird rather

than producing body heat. Furthermore, it is necessary to keep a continuous flow of air through the poultry house to dissipate ammonia that is generated as a waste product by the chickens. A minimum air flow of 3 mph in the poultry house is necessary to prevent chickens from being injured by ambient ammonia in the poultry house. Brooder heaters in the house must operate under air flow conditions sufficient to exhaust the ammonia. It is necessary in some climates to run higher ventilation rates (for example in tunnel houses using evaporative cooling) during the day to assist with cooling, but still need the heat at night when the outside temperature cools. Under these operating conditions the air flow within the poultry house is 7-9 mph. The wind outside the poultry house can also influence the air flow inside the house. Therefore, it is desirable that the heaters operate reliably under a variety of operating conditions. A problem with the current heaters, and in particular poultry brooders having a radiant or ceramic heating element with a gas pilot light, is that when the air flow is above 3 mph there is sufficient flow to either blow the pilot light out or to displace the flame of the pilot light from the thermocouple, such that the thermocouple is cooled, thereby generating a false signal that the pilot light has been blown out. The thermocouple then causes the burner's solenoid gas valve to shut off the gas supply line.

Therefore, what is needed is a brooder heater that can reliably turn on and off over a range of air flow conditions. When off, the pilot light of the pilot assembly reliably stays lit, and the thermocouple accurately detects that the pilot light is burning therein maintaining the gas supply valve actuatable. When turned on, the gas supply line is actuated, the pilot assembly ignites the gas with an acceptable level of flash, the pilot light remains lit, and the thermocouple accurately detects that the pilot light is burning.

A typical brooder chicken house has 15 – 30 brooder heaters, and after each lot of chickens are grown, approximately 6–8 weeks, the brooder heaters are serviced prior to bringing in the next group of chickens. What is needed is maintenance friendly heater, wherein the pilot light orifice can be easily accessed and cleaned.

SUMMARY OF THE INVENTION

5 The invention is a windshield that works synergistically in concert with a gas pilot light assembly, which also has components that provide some protection from high air flow; wherein the windshield and pilot light assembly are an apparatus that ensures the dependable operation of a burner, and specifically the reliable operation of a brooder heater burner in high air flow conditions. The pilot assembly, which is mounted proximal to the burner, is
10 comprised of a pilot light; a pilot light orifice; a vented pilot housing (stack) with a flame deflector cap; a pilot light gas line; a thermocouple with connecting electrical leads; a pilot base; a mounting bracket; and a pilot assembly windshield. The vented pilot housing can also have a thermocouple restrictor plate, which shields the thermocouple from updrafts and directs the flame toward the thermocouple. The restrictor plate ensures that the
15 thermocouple is heated, and prevents an errant signal causing the gas supply line to close. The windshield, which is a partially perforated tubular chamber, intersectingly slid onto the mounting bracket, provides a protected zone of air infusion for both the pilot flame and for the thermocouple. The mounting bracket is preferably slotted such that the windshield can be positioned by merely aligning the windshield with the slots on the mounting bracket, and
20 sliding the windshield into the slots, or removed by merely sliding the windshield off the slots. The configuration enables the quick removal and replacement of the windshield. Likewise, the vented pilot housing can be simply lifted off the pilot base, enabling quick access to the pilot light orifice so that it can be easily cleaned. The easy removal of both the windshield and the vented housing reduces the servicing time, and in general results in a
25 maintenance friendly brooder. Another feature of the apparatus is that the windshield need not be removed to ignite the pilot light. The pilot assembly can have either a vertical or a horizontal orientation or any angle in between. The pilot light flame is directed by the flame deflector cap and the restrictor plate so that it is very close or actually impinges the thermocouple.

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Both ends of the windshield are open, enabling air to flow vertically with less shielding, while effectively deflecting crosswinds. The combination of the vented pilot

housing with the flame deflector cap, restrictor plate, and the windshield produce a synergistic effect, enabling the poultry brooder heater to have superior tolerance to variations in air flow, and ease of cleaning. Furthermore, the apparatus enables the use of a pilot light having small jet orifice, which reduces gas consumption by the pilot light. The
5 invented assembly enables the pilot light to reliably remain lit in air flows of 7 – 9 mph, and the thermocouple stays sufficiently warm that it does not generate a false signal that the pilot light is extinguished, therein causing the gas to the brooder to be shut off.

 The invention can be appropriately sized and combined to accommodate any size
10 heater or bank of heaters, and it is suitable for both ceramic and radiant heaters. Furthermore, the pilot assembly is suitable for all commercial fuels that can be gasified fuels, such as natural gas, propane, butane and kerosene.

 It is further anticipated that the apparatus can be used on other types of heaters, in
15 addition to brooders.

OBJECTS OF THE INVENTION

20 Accordingly, a first object of the present invention is to provide an apparatus for a brooder heater having a ceramic or radiant element, wherein the heater has enhanced operating reliability at higher air flows as compared to heaters fitted with conventional pilot light assemblies.

25 A second object of the present invention is to provide an improved pilot light assembly for a brooder heater having a ceramic or radiant element, wherein the thermocouple does not incorrectly sense that the pilot light is extinguished.

30 A third object of the present invention is to provide a windshield for an improved pilot light assembly for the brooder heater, wherein the pilot light is not extinguished at higher air flows as compared to conventional pilot light assemblies.

A fourth object of the present invention is to provide an apparatus for a brooder heater having a ceramic or radiant element, wherein the apparatus provides a maintenance friendly brooder having quick access to the pilot light orifice.

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A fifth object of the present invention is to provide an apparatus for a gas fueled heater, wherein one or more pilot light assemblies can be used with various sized heaters.

A sixth object of the present invention is to provide an apparatus, wherein the pilot
10 light assembly can have an orientation that is vertical or angled, such as a horizontal orientation.

A seventh object of the present invention is to provide an apparatus, wherein the
15 pilot light can be ignited without removing the windshield.

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An eighth object of the present invention is to provide an apparatus, wherein the pilot
light is energy efficient.

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BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, referred to herein and constituting a part hereof,
illustrate preferred embodiments of the product of the present invention, and together with
25 the description serve to explain the principles of the invention.

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FIG. 1 is an exploded poultry brooder heater having a ceramic element, where the
heater is constructed in accordance with the present invention. The apparatus is a
synergistic combination of a pilot light assembly and a windshield
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FIG. 2A is an enlarged top view of the windshield as shown in **FIG. 1** as part of the
poultry brooder according to the present invention.

FIG. 2B is an enlarged side view of the windshield as shown in **FIG. 1** as part of the poultry brooder heater according to the present invention.

5 **FIG. 3** is an enlarged, isometric view of the windshield.

FIG. 4 is an enlarged, isometric view of the pilot light assembly.

10 **FIG. 5** is an enlarged, isometric view of the apparatus, wherein the windshield is seated on the pilot assembly.

FIG. 6 is a perspective view of the poultry brooder heater having a ceramic element shown in **FIG. 1**.

15 **FIG. 7** is a perspective view of a poultry brooder heater having a radiant element.

FIG. 8 is a partially exploded poultry brooder heater shown in **FIG. 7** illustrating how the apparatus is mated with the heater having a radiant element.

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DETAILED DESCRIPTION OF THE INVENTION

25 Referring now in particular to **FIG. 1**, there is illustrated a preferred embodiment of the poultry brooder in accordance with the present invention, indicated generally by reference numeral **100**. As here embodied, poultry brooder heater **100** includes an inverted conical ceramic element **44** having radiant projections **50** protruding from and substantially covering the bottom surface of the element. The brooder heater **100**, preferably, is
30 suspended from overhead by attachment to the hanger **48**, which is fitted to reflector **46**. The ceramic element is seated on the ceramic holder ring **42**. The ceramic holder ring **42** is held by support braces **40**, at the point where the support braces have an outboard deflection.

The upper end of the support braces **40** are removably mounted on the underside of reflector **46**, thereby supporting the ceramic element **44**, the holder ring **42**, the pilot assembly **20**, the burner **52** and the burner pan **18**. The burner **52** and the pilot assembly **20** are mounted on the burner pan **18**. The invented windshield **10** is seated on the pilot assembly **20**. The
5 burner is supplied fuel by the burner supply line **58**, and the pilot assembly **20** is supplied gas by the pilot gas line **38**.

A top view of the windshield **10** is shown in FIG. 2A. A side view of the windshield is shown in FIG. 2B. The windshield has a perforated zone **12** and a solid zone **14**, where
10 the windshield is not perforated. Preferably the perforated zone **12** extends around the entire periphery, such that the solid zone **14** is only that small area between the holes. The windshield **10** is oriented on the pilot assembly so as to provide deflection of the airflow away from the pilot light flame. As shown in Fig. 6, the burner **52** is positioned directly under the inverted crown of the ceramic element **44**. The pilot assembly **20** is mounted near
15 the perimeter of the ceramic element **44**. The perforated zone **12** extends around the entire periphery of the windshield **10**, as shown in Fig. 6. Fig. 3 is an isometric view of the windshield. The windshield **10** is comprised of stainless steel that is formed into an open ended chamber that is substantially rectangular. A butted joint **16** is on one wall of the windshield **10**.

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The pilot assembly **20** is illustrated in Fig. 4. The pilot assembly **20** is comprised of an orifice jet (not shown), that is seated in an orifice holder **30**, which is supplied fuel by the pilot light gas line **38**. Burning fuel emanating from the orifice jet produces the pilot light
25 flame **56**. The vented pilot housing **26** is attached to the pilot light base **28**. The top of the vented housing **26** has a flame deflector cap **27**, which directs the flame **56** toward the thermocouple **22**. Note, the flame substantially impinges the thermocouple **22**. As shown in Fig. 4, the vented pilot housing provides wind protection for the pilot light. Another wind protection component of the pilot assembly **20** is a thermocouple restrictor plate **23**, which
30 shields the thermocouple from updrafts. The restrictor plate **23** diverts updrafts, which would cause the pilot light flame to be diverted away from the thermocouple, and possibly

result in an errant signal causing the gas supply line to close. The vented pilot housing 26 has restrictor ports 29 and 34 that provide low flow velocity supply air for the pilot light orifice. The thermocouple 22, also mounted on the pilot base 28, is adjacent to the pilot light 56. As shown in Fig. 5, the apparatus 1, is comprised of the windshield 10 and the pilot assembly 20. The windshield 10 is held in position by slots 36, which are cut into corners of the pilot holder bracket 24. In Fig. 5, the shielded portion of the pilot assembly is shown in ghost with shadow lines to indicate that those components of the pilot assembly would not be visible.

Fig. 7 is a perspective view of radiant heater 200, wherein gases are combusted in a perforated stainless steel emitter chamber 51. The radiant heater 200 has an inner cone helps direct the burner flame toward the emitter chamber 51. The majority of the functional components of the apparatus 1 project into the perforated stainless steel emitter chamber 51. The emitter chamber is substantially frustoconical in shape. The apparatus 1 is mounted to a burner plate 43, as shown in Fig. 8. The emitter chamber 51 is open at the bottom. The apparatus, comprised of the pilot light assembly 20 and the windshield 10, are substantially the same as described for the ceramic element heater 100. The burner assembly 53 provides mixed combustion gases to the center of the emitter chamber 51. The burner pan 19 is suspended from the burner assembly 53.

FIG. 8 is a partially exploded poultry brooder heater shown in Fig. 7, illustrating how the apparatus is mounted. The apparatus 1 has an angled bracket 81, which positions the apparatus at the perimeter of the burner plate 43.

SUMMARY OF THE ACHIEVEMENT OF THE OBJECTS OF THE INVENTION

From the foregoing, it is readily apparent that I have invented an apparatus for brooder heaters having a ceramic or radiant element, where the synergistic combination of a windshield and a pilot light assembly enable a brooder heater to reliably operate in higher air

flows. What is provided is a pilot light that is not extinguished, and a thermocouple that is protected and, therefore does not falsely detect that the pilot light is extinguished. The apparatus is more efficient in that a smaller pilot light flame can be used, thereby reducing fuel consumption. The apparatus is robust enough that it can be employed to ignite
5 combustion gases in a radiant heater emitter chamber, and effective enough that it improves the reliability of both ceramic and radiant heaters, where both are known to be susceptible to malfunction in higher air flows.